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The experimental and numerical analysis of the ballistic resistance of polymer composites

Joanna Pach[1*], Dariusz Pyka[2], Krzysztof Jamroziak[3*], Paulina Mayer[1]

[1]Wroclaw University of Science and Technology, Faculty of Mechanical Engineering, Chair of Foundry, Polymers and Automation, Laboratory of Plastics, Lukasiewicza 5, 50-371 Wroclaw, Poland,
e-mail: joanna.pach@pwr.edu.pl, paulina.mayer@pwr.edu.pl

[2]Military Institute of Engineer Technology, Ammunition Testing Laboratory, Obornicka 136, 50-961 Wroclaw, Poland,
e-mail: pykadariusz@gmail.com

[3]Wroclaw University of Science and Technology, Faculty of Mechanical Engineering, Department of Mechanics, Materials Science and Engineering, Smoluchowskiego 25, 50-370 Wroclaw, Poland,
e-mail: krzysztof.jamroziak@ interia.pl

*Corresponding author: e-mail address: joanna.pach@pwr.edu.pl, krzysztof.jamroziak@ interia.pl

Abstract:

This paper concerns the ballistic resistance of hybrid composite shields. The analysis covers three types of two-layer composites. The first shield layer were plates of tungsten carbide (WC), ceramic balls Al_2O_3 (aluminum oxide 92) or steel balls (100Cr6 steel) embedded in a polymer matrix. The second layer was a laminate consisting of 10 layers of aramid fabric in a matrix of styrene-butadiene-styrene (SBS) copolymer. The study presents the analysis of damage caused by a ballistic impact, further compared to the results of computer simulations conducted using the finite element method (FEM). Samples were overshot along the ballistic track from the Beryl rifle. The 5.56 x 45mm ammunition with the bullet of SS109 MESCO type was used.

Keywords: A. Polymer-matrix composites (PMCs); A. Laminates; B. Impact behavior; C. Computational modeling; Ballistic shield